

IN THE CLAIMS:

Please amend claims 1, 2, 17-20 and 30-32 as follows. A marked-up copy of the claims is attached.

1. (Amended) An optical device comprising:

an optical element having a container and first and second liquids contained sealingly in said container, said first and second liquids being substantially equal in refractive index, said first and second liquids existing without mixing with each other, said first and second liquids differing from each other in transmittance, said first and second liquids making the boundary between said first and second liquids having a predetermined shape; and

an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids,

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between a side surface of the container and the boundary between said first and second liquids.

2. (Amended) An optical device comprising:

an optical element having a container and first and second liquids contained sealingly in said container, said first and second liquids being substantially equal in refractive index, said first and second liquids existing without mixing with each other, said

first and second liquids differing from each other in transmittance, said first and second liquids making the boundary between said first and second liquids having a predetermined shape;

B1 an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids; and

a voltage application circuit for applying a voltage to said electrode,

wherein the shape of the boundary between said two liquids is changed by application of a voltage through said electrode to change the quantity of transmitted light in the bundle of rays passing through said optical element, and

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between a side surface of the container and the boundary between said first and second liquids.

17. (Twice Amended) An optical system in which an image is formed on an image formation plane through a lens element, said optical system comprising at least one of a diaphragm and a shutter incorporated in said lens element,

B2 wherein said at least one of the diaphragm and the shutter is formed by an optical element having a container and first and second liquids contained sealingly in said container, said first and second liquids being substantially equal in refractive index, said first and second liquids existing without mixing with each other, said first and second

liquids differing from each other in transmittance, and said first and second liquids making the boundary between said first and second liquids having a predetermined shape,

B2 wherein an electrode is formed in said optical element in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids, and

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between a side surface of the container and the boundary between said first and second liquids.

18. (Amended) A photo-taking device comprising:

an imaging optical system for forming a subject image;

an optical element for changing the quantity of transmitted light in a bundle of rays passing through said imaging optical system;

B3 image pick-up means for recording the subject image;

said optical element having a container and first and second liquids contained sealingly in said container, said first and second liquids being substantially equal in refractive index, said first and second liquids existing without mixing with each other, said first and second liquids differing from each other in transmittance, said first and second liquids making the boundary between said first and second liquids having a predetermined shape;

an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids; and

a voltage application circuit for applying a voltage to said electrode,

wherein the shape of the boundary between said two liquids is changed by application of a voltage through said electrode to change the quantity of transmitted light in the bundle of rays passing through said optical element, and

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between a side surface of the container and the boundary between said first and second liquids.

19. (Amended) An optical device comprising:

an optical element having a container having a side surface inclined at a predetermined angle from an optical axis, and first and second liquids contained sealingly in said container, said first and second liquids differing substantially from each other in transmittance, said first and second liquids existing without mixing with each other, said first and second liquids making the boundary between said first and second liquids having a rounded shape; and

an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids,

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between the side surface of the container and the boundary between said first and second liquids.

20. (Amended) An optical device comprising:

B3: an optical element having a container having a side surface inclined at a predetermined angle from an optical axis, and first and second liquids contained sealingly in said container, said first and second liquids differing substantially from each other in transmittance, said first and second liquids existing without mixing with each other, said first and second liquids making the boundary between said first and second liquids having a rounded shape;

an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids; and

an application circuit for applying a voltage to said electrode,

wherein the shape of the boundary is changed by application of a voltage to change the refractive power with respect to light passing through said optical element, and

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between the side surface of the container and the boundary between said first and second liquids.

30. (Twice Amended) An optical system in which a predetermined image is formed or light of the image is converged by a lens element, said optical system comprising a variable-power element incorporated in the lens element,

34 wherein said variable-power element has a container having a side surface inclined at a predetermined angle from an optical axis, and first and second liquids contained sealingly in said container, said first and second liquids differing substantially from each other in refractive index, said first and second liquids existing without mixing with each other, and said first and second liquids making the boundary between said first and second liquids having a rounded shape,

wherein an electrode is formed in said variable-power element in such a place as to avoid interference with passage of a bundle of rays incident upon said variable-power element, said electrode being ring-shaped to surround at least one of said first and second liquids, and

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between the side surface of the container and the boundary between said first and second liquids.

35 31. (Amended) An optical system in which a predetermined image is formed or light of the image is converged by a lens element, said optical system comprising:

an optical element constituting a portion of said optical system, said optical element including a container having a side surface inclined at a predetermined angle from an optical axis, and first and second liquids contained sealingly in said container, said first and second liquids differing substantially from each other in refractive index, said first and second liquids existing without mixing with each other, said first and second liquids making the boundary between said first and second liquids having a rounded shape; and

an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids,

135 wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between the side surface of the container and the boundary between said first and second liquids.

32. (Amended) A photo-taking device comprising:

an imaging optical system for forming a subject image:

a variable-power optical element incorporated in said imaging optical system, said variable-power optical element including a container having a side surface inclined at a predetermined angle from an optical axis, and first and second liquids contained sealingly in said container, said first and second liquids differing substantially from each other in refractive index, said first and second liquids existing without mixing

with each other, said first and second liquids making the boundary between said first and second liquids having a rounded shape;

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an electrode formed in such a place as to avoid interference with passage of a bundle of rays incident upon said optical element, said electrode being ring-shaped to surround at least one of said first and second liquids; and

image pick-up means for recording the subject image,

wherein an angle ψ is set so that a curvature radius of the boundary between the first and second liquids becomes large, where said angle $\psi = 90^\circ - \theta$, with θ being a contact angle between the side surface of the container and the boundary between said first and second liquids.

REMARKS

This application has been reviewed in light of the Office Action dated October 22, 2002.

The claims are 1-15, 17-28 and 30-32, with claims 1, 2, 17-20 and 30-32 being independent. The independent claims have been amended to better define the present invention. Support for this amendment may be found throughout the specification, the drawings and the claims, for example, at pages 56 and 57 and in Figs. 21A-B. No new matter has been added. Reconsideration of the present claims is expressly requested.

Claims 30 and 32 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by WO 99/18456 (Berge). Claims 1-15, 17-28 and 30-32 stand rejected under the judicially created doctrine of obviousness-type double patenting as being allegedly